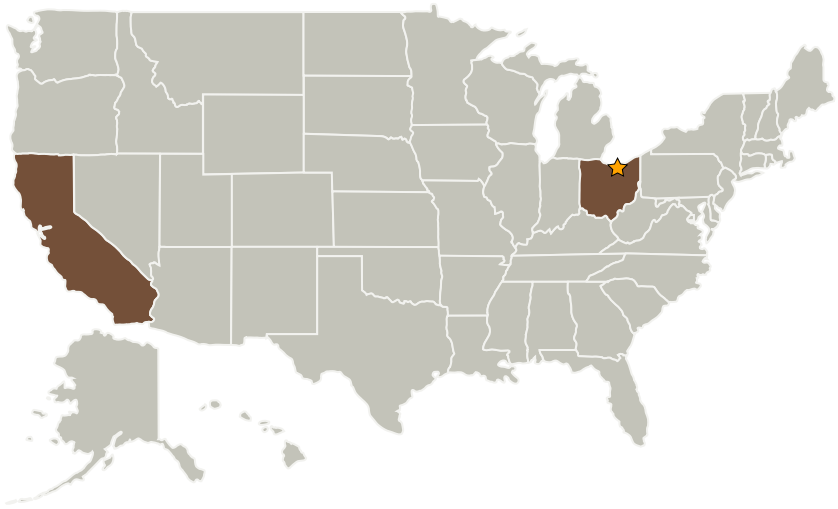
Modular Distributed Concentrator for Solar Furnace, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

This research proposes to develop a lightweight approach to achieving the high concentrations of solar energy needed for a solar furnace achieving temperatures of 1000-2000C. Conventional solar-fired furnaces face significant challenges in fabricating, deploying and pointing the large aperture, high concentration ratio reflectors that power them. The Modular Distributed Concentrator (MDC) is a systems solution comprising an array of identical, modestly sized solar concentrator dishes with a network of optical or thermal transmission links that route the high quality concentrated energy to a centralized receiver. The approach provides lower mass because of the ability to optimize the scale of the individual reflectors to achieve high concentration ratio without the heavy structure needed to achieve and maintain optical alignment found in large aperture optics. The minimum deployed height associated with an array of concentrators allows for good packaging efficiency and minimum deployment complexity, and since the dishes are one-piece and identical, tooling and manufacturing costs are significantly reduced. The proposed program performs system optimization trades and then proceeds to the preliminary design and development of key components such as the optical light guide and thermal heat pipe transmission links that carry the energy to the furnace, as well as the key input and output interfaces. A proof-of-concept demonstration in Phase I will be used to validate the performance model and guide the detailed design, development and environmental testing of system components in Phase II.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Vanguard Space Technologies, Inc	Supporting Organization	Industry	San Diego, California

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors